

Rate of release in Turkish model cord blood banking: A single-center experience

Rate of release in turkish model cord blood banking

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Abstract

Aim: Cord blood has been successfully used since 1988 as a source of hematopoietic stem cells. Freezing and storing cord blood at -196°C and allowing it to be used when needed are the basis for cord blood banking applications. There are more than 100 banks in the world and 10 in Turkey. While the release rates of different centers in the world are known, data on the release rates of centers operating in Turkey have not yet been published. The aim of this study is to retrospectively evaluate the ratio of cord blood released with the purpose of hematopoietic stem cell transplantation and banking periods at a center engaged in Turkish Model Cord Blood Banking.

Materials and Methods: The study included the applicants of the Akdeniz University Technopark BabyLife Cord Blood Bank and Human Cell-Tissue Production Center for cord blood banking services. In this cross-sectional retrospective study, data recorded in the Korddata data logging program between 01/01/2018 and 31/12/19 (over 24 months) were analyzed.

Results: In the first year, 726 units of cord blood were collected. Three units of the collected blood were released for transplantation purposes. In the second year, 709 units of cord blood were collected and 7 were released for transplantation. The release rate was 0.41% in the first year, which increased to 0.99% at the end of the second year.

Discussion: The Turkish Model Cord Blood Banking specific to our country is a mixed model in which private and public banking is performed together. In this study, for the first time in the literature, release rates from a center engaged in Turkish Model Cord Blood Banking have been published. Release rates for Turkey can be evaluated when other centers adopting similar models publish their data.

Keywords

Cord blood; Hematopoietic stem cell; Bone marrow Transplantation

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Introduction

Cord blood has been successfully used since 1988 as a source of hematopoietic stem cells [1]. The first application and the following four different applications showed that cord blood can be processed and stored in a laboratory environment and can be banked in an evidence-based manner [2, 3]. After the initial data, it was predicted that the blood stored at -196°C could be used for bone marrow transplantation and cord blood banks could be established safely for this purpose and in 1993, the first cord blood bank was established in New York [4]. Subsequent data revealed that cord blood, received under appropriate conditions and frozen, can be stored for more than 20 years, preserving biological properties [5].

Cord blood banking models are mainly divided into two: public banking and private banks. There are more than 100 banks in the world and 10 in Turkey. In these banks, ~5 million units of cord blood are stored, including 800,000 public and 4 million private units [6]. The fundamentals of the banking model specific to Turkey were defined by the cord blood banking regulation published in 2005 and later passed to the literature as the "Turkish Model" [7, 8].

The main purpose of the Turkish Model is to ensure that private banks store cord blood to a certain amount (up to 25%) free of charge for transplantation to patients determined by the Ministry of Health for allogeneic use. Finding a source of hematopoietic stem cells to use for allogeneic purposes takes a certain amount of time. Data in the United States report it must be obtained from mobilized peripheral blood in a period of 3-4 months and an average of 12 days if it is to be obtained from cord blood. Cord blood banks provide significant advantages as they store products with ample shelf life that are quickly accessible [6]. While the release rates of different centers in the world are known, data on the release rates of centers operating in Turkey have not yet been published.

The aim of this study is to retrospectively evaluate the ratio of cord blood released with the purpose of hematopoietic stem cell transplantation and banking periods at a center engaged in Turkish Model Cord Blood Banking.

Material and Methods

This is a cross-sectional and retrospective study. The study included the applicants from the Akdeniz University Technopark BabyLife Cord Blood Bank and Human Cell-Tissue Production Center for cord blood banking services. The release rates were calculated by detecting the number of released cord bloods only from this center for bone marrow transplantation between 01/01/2018 - 31/12/19. None of the centers operating in Turkey have published release rates so far. Data only from a single center were evaluated in this study. During the two years duration of the study, cord blood stored in the center and released for bone marrow transplantation was determined by evaluating the data in the product files and the Korddata data recording program. Approval from the clinical research ethics committee of Akdeniz University Faculty of Medicine with decision number 147, dated 21.02.2018 was obtained for this study.

Results

In this study, the products taken into permanent storage in the bank over a 2-year period and released for hematopoietic stem cell transplantation were evaluated. The study included the applicants from the Akdeniz University Technopark BabyLife Cord Blood Bank and Human Cell-Tissue Production Center for cord blood banking services. In the first year, 726 units of cord blood were collected. Three units of the collected blood were released for transplantation purposes. In the second year, 709 units of cord blood were collected and 7 were released for transplantation. The first-year release rate was 0.41%, which increased to 0.99% at the end of the second year (Figure 1).

Transplantations were performed for the following diseases: Thalassemia Major, Fanconi Aplastic Anemia, Immune Deficiency, Juvenile Myelomonocytic Leukemia, Congenital Neutropenia, and Acute Lymphoblastic Leukemia. In total, 10 units of cord blood were released for transplantation.

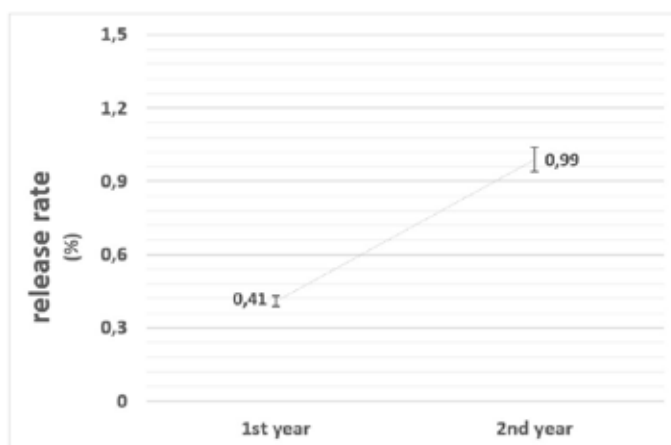


Figure 1. Number of cord blood received and release rates (24-month period: number of cord blood collected in the first year $n=726$, number of transplants =3, number of cord blood collected in the second year $n=709$, number of transplants = 7).

Discussion

Cord blood banking applications have an important place in hematopoietic stem cell transplantation. More than 40,000 units of cord blood have been successfully transplanted to date [6]. The aim of the globally accepted cord blood banking models is to create a pool for cord blood-based allogeneic hematopoietic stem cell transplantation. The allogeneic cord blood pool has an important place in allogeneic transplantations. The amount of cord blood that must be kept in a bank to meet the needs or demands of the public varies depending on the population; accordingly, release rates also vary from bank to bank. According to the latest data, ~800,000 units of cord blood are stored in state-owned banks in the world, and the annual number of units released is 4100 [4]. On the other hand, more than 4 million units of cord blood are stored in private banks and 130 units are released annually. Also, some banks such as Mexico City, Besancon, and Tokyo report high release rates (10-16% of their inventory), although the number of cord blood units stored in these banks is unknown [6]. There are 10 banks operating in Turkey that are approved by the Ministry of

Health, but no data on release rates have yet been published. In the present study, products received and released over a 2-year period were evaluated. The release rates were calculated by detecting the number of released cord bloods only from this center for bone marrow transplantation between 01/01/2018 - 31/12/19. Data only from a single center (Akdeniz University Technopark BabyLife Cord Blood Bank and Human Cell-Tissue Production Center) were evaluated in this study. During the two years duration of the study, cord blood stored in the center and released for bone marrow transplantation were determined by evaluating the data in the product files and the Korddata data recording program. It can be seen that the release rate of the bank examined is close to the release rates of state-owned banks around the world. However, the Turkish Model Cord Blood Banking practice is a mixed model in which both private and public banking is performed together. Therefore, the release rate is higher compared to the release rates of private banks around the world.

Conclusion:

In this study, for the first time in the literature, release rates from a center engaged in Turkish Model Cord Blood Banking have been published. Release rates for Turkey can be evaluated when other centers adopting similar models publish their data.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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